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Convergence of approximate solutions to two-dimensional singular integral equation with Cauchy kernel in the integral metrics

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Abstract

© 2016,International Journal of Pharmacy and Technology. All rights reserved.The article is devoted to approximate solution to two-dimensional singular integral equation with the Cauchy kernel by the moment method. It is known from the theory of singular equations that finding an exact solution to such closed form equation is possible only in certain cases,and regular and singular integrals with complex densities have to be calculated to obtain a numerical result. Therefore,developments of approximate solution methods followed by theoretical justification are important for the theory and,in particular,for applications. In this study the convergence of the approximate solution method with regard to a singular integral equation is set forth in the broadest function space,namely,in the space of square summable [-1,1]×[-1,1] functions L = L [-1,1]2. For the correct statement of the problem,a pair of weighted spaces of the required elements and right parts are introduced,which are restrictions of the space of summable functions. Correctness of the considered equation is proved. Solution to the characteristic equation,as well as norms of a singular operator and an operator opposite to it are given. Computational scheme of the moment method is formed. Theorem about unique solvability of the resulting system of linear algebraic equations in the integral metric is proven.

Keywords

Approximation, Cauchy kernel, Integral metric, Moment method, Two-dimensional singular integral equation